

Determination of Like-Weather Days and Comparison of Airport Performance



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File: [ftp://apo130/Airport Analysis/ Weather Presentation/Like Weather \(2\).ppt](ftp://apo130/Airport Analysis/ Weather Presentation/Like Weather (2).ppt)

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**Federal Aviation
Administration**

Purpose

- ✦ To determine like-weather days and compute airport performance using ASPM/OPSNET metrics
- ✦ To provide comparison to determine if performance is getting better or worse when compared to like-weather days.
- ✦ Comparison metrics include
 - ✦ OPSNET operations
 - ✦ OPSNET weather delays
 - ✦ Terminal Arrival Efficiency Rate (TAER)
 - ✦ Percent of on-time arrivals
 - ✦ Average delays for all flights
 - ✦ Average delay for delayed flights
 - ✦ Average taxi-out time.

Weather Classification

✦ Classify weather on an hourly basis by airport as being

- ☁ None
- ☁ Minor
- ☁ Moderate
- ☁ Severe

How Would the Classification Be Used?

- ✦ Compare one time period to another in terms of percent of operations in each weather category.
- ✦ Use as an explanatory measure for changes in delay metrics.
- ✦ Be able to assess FAA procedural or technical improvements in handling flights in 'bad weather'.

Impacting Conditions Analyzed

- ☛ Wind.
- ☛ Ceiling.
- ☛ Visibility.
- ☛ OPSNET recorded weather delays.
- ☛ Severity of local weather conditions.
- ☛ Thunderstorms reported at nearby weather stations (50 miles).
- ☛ Airport arrival and departure rates (AAR and ADR).
- ☛ Enroute thunderstorms

Note:

- A weight value is applied to each impacting condition (0: not significant, 1: significant, 2: very significant, 3: extremely significant).

Scenario

[Scenario](#) [Public](#) [Edit](#) [Delete](#)

Default	Y		
lga1	N		
DFW1	N		

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Scenario Default

Facilities	Factors
ORD	Please Select

Facility : ORD

Scenario Variables

Factor Name	None		Minor		Moderate		Severe		Factor Weight	Mark Severe
	Min	Max	Min	Max	Min	Max	Min	Max		
Wind Speed in Knots :	<input type="text" value="0"/>	<input type="text" value="10"/>	<input type="text" value="11"/>	<input type="text" value="14"/>	<input type="text" value="15"/>	<input type="text" value="21"/>	<input type="text" value="22"/>	<input type="text" value="999"/>	<input type="text" value="2"/>	<input type="checkbox"/>
Ceiling in Hundreds of Feet :	<input type="text" value="999"/>	<input type="text" value="18"/>	<input type="text" value="17"/>	<input type="text" value="11"/>	<input type="text" value="10"/>	<input type="text" value="6"/>	<input type="text" value="5"/>	<input type="text" value="0"/>	<input type="text" value="2"/>	<input type="checkbox"/>
Visibility in Statute Miles :	<input type="text" value="999.99"/>	<input type="text" value="8"/>	<input type="text" value="7.99"/>	<input type="text" value="4"/>	<input type="text" value="3.99"/>	<input type="text" value="1.01"/>	<input type="text" value="1"/>	<input type="text" value="0"/>	<input type="text" value="2"/>	<input type="checkbox"/>
Number of Hourly OPSNET Weather Delays :	<input type="text" value="0"/>	<input type="text" value="8"/>	<input type="text" value="9"/>	<input type="text" value="20"/>	<input type="text" value="21"/>	<input type="text" value="34"/>	<input type="text" value="35"/>	<input type="text" value="999"/>	<input type="text" value="2"/>	
Severity of Local Weather Conditions :	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="3"/>	<input type="text" value="2"/>	
Thunderstorms Within 50 Miles :	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="999"/>	<input type="text" value="1"/>	
Hourly Airport Rates (AAR + ADR) :	<input type="text" value="999"/>	<input type="text" value="192"/>	<input type="text" value="191"/>	<input type="text" value="179"/>	<input type="text" value="178"/>	<input type="text" value="170"/>	<input type="text" value="169"/>	<input type="text" value="0"/>	<input type="text" value="2"/>	
ASPM Enroute Excess Miles :	<input type="text" value="0"/>	<input type="text" value="11.99"/>	<input type="text" value="12"/>	<input type="text" value="14.99"/>	<input type="text" value="15"/>	<input type="text" value="17.99"/>	<input type="text" value="18"/>	<input type="text" value="999.99"/>	<input type="text" value="0"/>	
ASPM Enroute Excess Time Flown :	<input type="text" value="0"/>	<input type="text" value="6.99"/>	<input type="text" value="7"/>	<input type="text" value="7.99"/>	<input type="text" value="8"/>	<input type="text" value="9.99"/>	<input type="text" value="10"/>	<input type="text" value="999.99"/>	<input type="text" value="0"/>	
Enroute Thunderstorms :	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="999"/>	<input type="text" value="1"/>	
Overall Impacting Conditions :	<input type="text" value="0"/>	<input type="text" value="0.29"/>	<input type="text" value="0.3"/>	<input type="text" value="0.43"/>	<input type="text" value="0.44"/>	<input type="text" value="1.5"/>	<input type="text" value="1.51"/>	<input type="text" value="999.9"/>	<input type="text" value="1"/>	

Basic Methodology to Determine Like-Weather Days (0700-2150)

- ✦ (1) Examine by hour each weather factor (wind, ceiling, visibility, airport weather, nearby thunderstorms, enroute thunderstorms), from January 2000 until comparison date.
- ✦ (2) Calculate impact of match (4 points for severe, 3 points for moderate, 2 points for minor and 1 point for none).
- ✦ (3) Calculate impact of no match (severe and none = -3, severe and minor = -2, severe and moderate = -1, moderate and minor = -1, moderate and none = -2).
- ✦ (4) Sum (2) and (3) for all weather factors for each hour.
- ✦ (5) Multiply total in (4) by scheduled operations for that hour.



✦ (6) Sum all hourly totals to obtain a daily matching score.

✦ (7) Determine the five days with the highest matching score.

✦ (8) Determine the median value from the five days for each performance metric.

Notes:

Weighting scheme gives most points for matching when weather impact is severe and penalizes when weather impact is most different.

Weighting scheme also gives most weight to busiest hours of day.

Weekdays are compared to weekdays and weekend days compared to weekend days (this is done to account for different operations levels).

Weather Factors

ASPM : Weather Factors : Like Days Comparison By Facility

From 5/29/2006 To 5/29/2006 : 'ORD'

Facility	Date	Actual Matched Score	Maximum Matched Score	% Actual Of Maximum	OPSNET Operations	OPSNET Delays	OPSNET Weather Delays	TAER	Percent On-Time Arrivals	Average Delay For ALL Flights	Average Delay For Delayed Flights	Average Taxi-Out
Comparison Like Days	ORD 05/29/2006				2374	655	652	95.41	66.33	40.47	118.05	47.9
	08/17/2004	14948	34836	42.91	2767	368	347	85.39	68.73	29.53	91.62	19.95
	07/16/2004	18415	35273	52.21	2624	591	579	94.93	54.67	52	112.67	28.7
	05/12/2004	16557	34906	47.43	2621	791	783	92.06	61.79	37.84	96.23	47.53
	06/25/2003	15432	33116	46.6	2672	704	695	100	67.08	18.39	52.79	26.99
	05/10/2001	16998	32929	51.62	2707	675	327	100	61.34	25.45	62.5	26.17
Median					2672	675	579	94.93	61.79	29.53	91.62	26.99
Difference					-298	-20	73	0.48	4.54	10.94	26.43	20.91
%Difference					-11.15	-2.96	12.61	0.51	7.35	37.05	28.85	77.47

Schedule based computations.



Weather Factors

Weather Factors Details Report - Scenario : Default

From 05/29/2006 To 05/29/2006 : 'ORD'

Locid	Date	Local	Scheduled	Wind	Temp (F)	Wind		Ceiling		Visibility		OPSNET		Airport		Near By		ADR+		Enroute		Overall	
		Hour	Operations	Dir		Speed	N x 100	(S.Miles)	Weather	Weather	TS	Cap	TS	AAR									
						(Knots)	(Feet)		Delays														
						Wt=2	Wt=2	Wt=2	Wt=2	Wt=2	Wt=2	Wt=2	Wt=2	Wt=1	Wt=1	Wt=2	Wt=2	Wt=1	Wt=1	Wt=1	Wt=1		
						Val	Impact	Val	Impact	Val	Impact	Val	Impact	Val	Impact	Val	Impact	Val	Impact	Val	Impact		
ORD	05/29/2006	0	6	210	78	5	None	999	None	10	None	2	None	-	None	0	None	192	None	0	None	0	None
ORD	05/29/2006	1	8	200	79	6	None	999	None	10	None	1	None	-	None	0	None	192	None	0	None	0	None
ORD	05/29/2006	2	1	190	77	6	None	999	None	10	None	0	None	-	None	0	None	192	None	0	None	0	None
ORD	05/29/2006	3	3	190	76	6	None	999	None	10	None	0	None	-	None	0	None	192	None	0	None	0	None
ORD	05/29/2006	4	8	190	74	6	None	999	None	10	None	0	None	-	None	0	None	192	None	0	None	0	None
ORD	05/29/2006	5	25	160	75	3	None	250	None	10	None	0	None	-	None	0	None	192	None	0	None	0	None
ORD	05/29/2006	6	83	160	75	3	None	250	None	10	None	0	None	-	None	0	None	192	None	0	None	0	None
ORD	05/29/2006	7	135	200	79	8	None	250	None	10	None	0	None	-	None	0	None	192	None	0.26	Minor	0.07	None
ORD	05/29/2006	8	174	190	81	7	None	999	None	10	None	0	None	-	None	0	None	192	None	0.04	None	0	None
ORD	05/29/2006	9	162	200	83	6	None	999	None	10	None	0	None	-	None	0	None	192	None	0	None	0	None
ORD	05/29/2006	10	162	190	88	9	None	250	None	10	None	0	None	-	None	0	None	192	None	0	None	0	None
ORD	05/29/2006	11	148	200	89	8	None	70	None	10	None	0	None	-	None	0	None	192	None	0.44	Minor	0.07	None
ORD	05/29/2006	12	161	200	89	8	None	70	None	10	None	0	None	-	None	5	Severe	192	None	0.84	Moderate	0.36	Minor
ORD	05/29/2006	13	190	200	-	13	Minor	60	None	10	None	38	Severe	-	None	7	Severe	192	None	0.69	Moderate	0.93	Moderate
ORD	05/29/2006	14	158	200	-	13	Minor	60	None	10	None	50	Severe	-	None	12	Severe	168	Severe	1.56	Severe	1.43	Moderate
ORD	05/29/2006	15	173	240	-	23	Severe	55	None	1.75	Moderate	71	Severe	-TSRA	Severe	15	Severe	144	Severe	1.35	Severe	2.43	Severe
ORD	05/29/2006	16	170	080	71	5	None	35	None	8	None	76	Severe	-TSRA	Severe	14	Severe	128	Severe	1.26	Severe	1.71	Severe
ORD	05/29/2006	17	176	080	71	5	None	35	None	8	None	75	Severe	-TSRA	Severe	5	Severe	128	Severe	1.83	Severe	1.71	Severe
ORD	05/29/2006	18	174	150	74	7	None	120	None	10	None	85	Severe	-	None	5	Severe	120	Severe	1.2	Severe	1.29	Moderate
ORD	05/29/2006	19	172	150	74	7	None	120	None	10	None	77	Severe	-	None	3	Severe	160	Severe	1.65	Severe	1.29	Moderate
ORD	05/29/2006	20	165	180	73	4	None	120	None	10	None	111	Severe	-	None	2	Severe	160	Severe	1.45	Severe	1.29	Moderate
ORD	05/29/2006	21	96	210	73	4	None	150	None	10	None	44	Severe	-	None	0	None	160	Severe	0.68	Moderate	1.00	Moderate
ORD	05/29/2006	22	27	210	73	4	None	150	None	10	None	16	Minor	-	None	0	None	160	Severe	0.09	None	0.57	Moderate
ORD	05/29/2006	23	14	000	68	0	None	250	None	10	None	6	None	-	None	0	None	160	Severe	0.09	None	0.43	Minor



Weather Factors

Weather Factors Details Report - Scenario : Default

From 07/16/2004 To 07/16/2004 : 'ORD'

		Local Hour	Scheduled Operations	Wind Dir			Wind Speed (Knots)	Ceiling N x 100 (Feet)	Visibility (S.Miles)	OPSMET Weather Delays	Airport Weather	Near By TS	ADR+ Cap AAR	Enroute TS			Overall						
Locid	Date			Temp (F)	Wt=2		Wt=2		Wt=2		Wt=2		Wt=2		Wt=1		Wt=2		Wt=1		Val	Impact	
		Val	Impact	Val	Impact	Val	Impact	Val	Impact	Val	Impact	Val	Impact	Val	Impact	Val	Impact	Val	Impact	Val	Impact		
ORD	07/16/2004	0	3	260	69	5	None	999	None	10	None	1	None	-	None	0	None	196	None	0	None	0.00	None
ORD	07/16/2004	1	3	260	69	4	None	999	None	10	None	0	None	-	None	0	None	196	None	0	None	0.00	None
ORD	07/16/2004	2	2	270	67	4	None	999	None	10	None	0	None	-	None	0	None	196	None	0	None	0.00	None
ORD	07/16/2004	3	3	270	67	4	None	999	None	10	None	0	None	-	None	0	None	196	None	0	None	0.00	None
ORD	07/16/2004	4	7	260	65	3	None	999	None	10	None	0	None	-	None	0	None	196	None	0.18	None	0.00	None
ORD	07/16/2004	5	25	240	64	3	None	999	None	10	None	0	None	-	None	0	None	196	None	0.13	None	0.00	None
ORD	07/16/2004	6	86	260	69	4	None	999	None	10	None	0	None	-	None	0	None	196	None	0	None	0.00	None
ORD	07/16/2004	7	151	300	77	6	None	150	None	10	None	0	None	-	None	0	None	192	None	0.15	None	0.00	None
ORD	07/16/2004	8	187	300	77	6	None	150	None	10	None	0	None	-	None	0	None	192	None	0.22	Minor	0.07	None
ORD	07/16/2004	9	174	250	79	7	None	180	None	10	None	0	None	-	None	0	None	192	None	0.19	None	0.00	None
ORD	07/16/2004	10	186	260	80	9	None	200	None	10	None	0	None	-	None	2	Severe	192	None	0.12	None	0.21	None
ORD	07/16/2004	11	168	280	81	10	None	200	None	10	None	7	None	-	None	7	Severe	192	None	0.39	Minor	0.29	None
ORD	07/16/2004	12	172	320	80	9	None	200	None	10	None	29	Moderate	-	None	9	Severe	192	None	0.94	Moderate	0.64	Moderate
ORD	07/16/2004	13	177	270	81	14	Minor	999	None	10	None	46	Severe	-	None	7	Severe	179	Minor	1.18	Severe	1.14	Moderate
ORD	07/16/2004	14	170	280	81	8	None	200	None	10	None	55	Severe	-	None	11	Severe	140	Severe	1.91	Severe	1.29	Moderate
ORD	07/16/2004	15	195	300	81	11	Minor	95	None	10	None	74	Severe	-	None	6	Severe	120	Severe	2.35	Severe	1.43	Moderate
ORD	07/16/2004	16	187	300	81	11	Minor	95	None	10	None	67	Severe	-	None	2	Severe	100	Severe	1.7	Severe	1.43	Moderate
ORD	07/16/2004	17	188	320	79	10	None	100	None	10	None	72	Severe	-	None	1	Severe	108	Severe	1.43	Severe	1.29	Moderate
ORD	07/16/2004	18	192	090	73	8	None	150	None	10	None	64	Severe	-	None	0	None	148	Severe	1.5	Severe	1.07	Moderate
ORD	07/16/2004	19	190	000	73	0	None	150	None	10	None	39	Severe	-	None	0	None	180	Minor	1.02	Severe	0.79	Moderate
ORD	07/16/2004	20	172	030	73	4	None	200	None	10	None	93	Severe	-	None	1	Severe	180	Minor	1	Severe	1.00	Moderate
ORD	07/16/2004	21	106	050	71	6	None	999	None	10	None	19	Minor	-	None	1	Severe	180	Minor	1	Severe	0.71	Moderate
ORD	07/16/2004	22	17	030	67	9	None	43	None	10	None	5	None	-	None	1	Severe	180	Minor	1.31	Severe	0.57	Moderate
ORD	07/16/2004	23	17	030	67	9	None	43	None	10	None	8	None	-	None	0	None	180	Minor	1.04	Severe	0.36	Minor



Example 1600 Hour (Local) for ORD

Weather Impact	5/29/06	7/16/04	Matching/ Non-Match
Wind Speed	None	Minor	-1
Ceiling	None	None	1
Visibility	None	None	1
Airport Weather	Severe	None	-3
Nearby Thunderstorms	Severe	Severe	4
Enroute Thunderstorms	Severe	Severe	4
Scheduled Operations	170		Total= 6
Hourly Matching Score		$170 * 6 = 1,020$	

